

FYSIKALISK-KEMISKA INSTITUTIONEN
UPSALA

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Nov 23

Dear Dr Heidelberger:

If I wait much longer, I'll be sending more of a pamphlet than a letter.
I had better start my making a table of molecular weights etc and then talking about them.

Species	% Antibody	$S + 10^{13}$	$D \times 10^{-7}$	M
Pig B ₂ A	72%	18.7		
W,A	10%	17.5		
W,B	15% salt soln	18.5		
W,B	84%	17.4	1.64	1,040,000
Cow D _{III}	100%	18.2; 17.9	1.69	1,023,000
Horse 902A	44%	17.7		
902B	in 15% salt soln	19.7		
902B	58%	17.2; 16.7	1.63	1,040,000
Rabbit 4562A	86%	7.0	3.83 4.13	159,000
Monkey*	in 15% salt in 0.9% salt	6.7	3.83	166,000 using value of 6.7 for s

* Also a small amount of 17 component

In my last letter I told you about the pig B₂A. I then made a fractionation from Pig W called W,A in the table. This only had 10% Hb but showed 43% of the 17 component in the centrifuge. On further purifying the antibody by the agglutination method W,B only a single component resulted. This would indicate that your antibody 17 component is not carried down in the specific ppt.

Horse 902A 3% saline extract showed only a single peak as did 902B the 15% salt extract. The original serum contains 20% antibody and 20% 17 comp.

in the ultracentrifuge. On purification, however, the resulting 902B was only 58% antibody. Apparently something happens in the process which alters the ability to react with S but does not affect the sedimentation constant or homogeneity. It certainly would be interesting to know why we vary in the purity of antibody we can get from them. The rest of the table speaks for itself - I am quite pleased having been able to get enough monkey antibody for an analysis, two centrifuge runs and a difference run. It seems to belong to the rabbit group although there was a definite but small amount of γ component in the 15% salt solution and the dialyzed antibody solution (which only contained 40% antibody). Since the γ component is less than 10% the γ component can also form antibody in the monkey. The original precipitate from all the 20 cc of monkey serum looked so small that I didn't expect to get anything.

I haven't any more different species to work with, but am of making a large amount of horse antibody and will begin a study of the pH stability range of the antibody correlating it with quantitative precipitins, which should be of considerable interest.

I had dinner with Dr. Kellso last week. He is going to get me some sera from convalescent pneumonia patients — they don't use serum therapy in Sweden, so I may be able to get some human antibody. He will also try to arrange for me to do complement fixations on some of these antibodies, but if possible they had better be done in N.Y. also. He and Mrs. Kellso send their regards. They have a very lovely baby which you didn't stay long enough to see.

The vaccine I took over with me is marvelous. Dr. Dubos certainly knows how to make the bugs stay nicely. I have prepared two antibody solutions — pig + horse by the agglutination method and have run a good many determinations.

We also have some very exciting cataphoresis results — It seems that horse antibody forms a new component in horse serum which migrates between the β + γ components. On removal of the antibody this component disappears. I am enclosing a picture of the whole serum and absorbed serum. The micro-apparatus will be available in a few days and we are planning to run the antibody prepared from the same serum (902B) and then perhaps send a note to Science. I hope you will be willing to send it for us, since it will save a good deal of time in mailing proof back and forth etc.

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The dye serum albumin arrived safely and we have made a scale run and done some more cataphoresis experiments. The scale run showed a single component with $s = 4.6$ as compared with a value of 5.1 for the light absorption method. It agrees at a good deal at the end of the run however. Dr. Pedersen feels that we are definitely dealing with a substance of the same order of magnitude as the Sa (the partial specific volume of the dye is probably much different from that of a protein) and that the apo protein is fairly well characterized but of course not as well as serum albumin. Technical difficulties in making the runs prevents better comparison. I am also enclosing a curve of the cataphoresis and the values of S_a for comparison. I think that a short paper for the J. E. M. would serve further to emphasize the need for continuing work using pure proteins as the starting material.

Dr. Pedersen & I are planning to make a micro cataphoresis run using the light absorption method to get an ~~idea~~ more quantitative idea of the cataphoretic homogeneity than the sedimentation affords, and we will then write something and send it to you.

I ran Dr. Keay's Tb fraction and the curve is extremely complicated. It looks much more complicated than the sedimentation zone or anything else I haven't had a chance to do much with it, but I'll write him more about it as soon as I can. Please apologize to him for my not having written and tell him that I really will write soon.

I had a very enjoyable time in Stockholm a few weeks ago. Prof. Brünjes was invited to give a lecture and I spent the week-end there. I had a long talk with Profes who is doing some really exciting work. He has found that heparin is produced by the mast cells of the liver. He asked me to apologize to you for his not having written and said that his will soon send you another paper and a longer one due later. I also met Brünjes who is a very enthusiastic Chf. We had a long discussion of current problems in the field and he sent me a copy of his thesis which is well worth having. Unfortunately he is unable to continue any of his work since he has no facilities and a full time teaching

position. I also dropped in on Rundstrom who sends his best wishes. He was going to a faculty meeting but took some time to show me the plans for his new institute which is being built. Dr. Kallas is leaving in a few weeks to work there. Rundstrom made me promise to come back and spend an afternoon looking over his laboratory etc. I also met Hugo Theorell and had a very interesting talk with him.

The people here are all wonderful and I am certainly trying to make the most of a swell opportunity to learn a good many new things. Dr. Træhns and Pedersen expect someone from the foundation to come up here soon. They feel sure they will have no difficulty in convincing him that the foundation would be making a mistake if they didn't buy me a micro-cataphoresis apparatus to take home. I'm a bit skeptical but we can only hope for the best.

Prof. Svedberg just returned Saturday. He has been extremely busy, but stopped me in the hall to tell me what a nice time he had at the laboratory. Dr. Pedersen showed me your letter - both you and Prof. Svedberg must have had an extremely interesting and hectic time.

I could only find two unused U.S. stamps on my last trip to Stockholm. They were commemorating the Sullivan Expedition issued in 1927 in 2¢ denomination, and were listed at twice face value so I didn't get them, but if you want them, I can see if they're still available next time. The store you pointed out on the map certainly didn't have much of a stock.

Dr. Horsfall is coming to work here for six months or a year and is expected before Christmas. It will be quite pleasant to have another researcher in the laboratory.

I was very glad to receive your first letter and learn that you had safely settled after getting back. Regards to everyone in the laboratory

Sincerely

Elvin

P.S. If you think we ought to send a note about the molecular weight, we can do that too.

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I thought I left something out. I also ran the 792 DD (0.7% saline extract - no preservative). Most of the protein had precipitated on transportation, but there were definitely two components — so it is definitely traceable to the original serum. Since they are not at all nice like any of the others, I suspect that some preservative must have been put in or something — that was the tattle marked phenol-ether which they told us had no preservative when you wrote and asked them. I wish there was some way we could check for it. The 15% salt extract has more than two components according to Dr. Petrusson one of \approx about 11-13 which would also indicate some degradation.

I also had a long chat with Dr. Lovell this afternoon and he wished to be remembered to you and Mrs. Heidelberger.

I am enclosing a check to Dr. Palmer to pay for the reprints.

Miss Seibert asks if you have any antiserum which reacts with Tb carbohydrate as she is anxious to test some of a polysaccharide which she separated from the Tuberculin by cataphoresis. The polysaccharide is non-toxic. Miss Seibert said that she wrote you about it some time before I arrived, but hadn't heard from you. Miss Seibert also sends her best wishes as do the rest of the laboratory.